LEVEL II ①

Layoffs and Unemployment Insurance.

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1.   Introduction

In recent years researchers have paid increasing attention
to the impact of the unemployment insurance system on various
labor market phenomena. Two strands of research in this area
can be distinguished. In the first, researchers have been con-
cerned with the influence of unemployment benefits on labor
supply and unemployment. In this work, the decision to partici-
pate in the labor force or to end a spell of unemployment rests
with the individual person. Unemployment benefits are viewed as
a subsidy to participation, leisure or search and, hence, both
labor force participation and unemployment duration should in-
crease with unemployment benefits. The papers by Classen, by
Ehrenberg and Oaxaca and by Hamermesh are outstanding examples
of this type of research.[1]

The second strand of research has been developed from the
recent work on labor contracts.[2] Explicit allowance is made
for temporary layoffs and recalls by firms in response to
changes in the demand for their output. Since laid-off employ-
ees qualify for unemployment benefits, the level of benefits may
well influence the pattern of layoffs and recalls. Moreover,

benefit payments are financed in the United States by a payroll tax which typically is partially _experience rated_. Experience rating means that a firm's tax rate rises (falls) in response to increases (decreases) in benefit payments to the firm's own ex-employees. Thus the higher the degree of experience rating, the higher will be the tax cost of temporary layoffs. Examples of theoretical models of a typical firm's response to changes in the unemployment insurance system are presented in the papers by Baily, Brechling and Feldstein.[3] Although these models have not been subjected to extensive tests relevant empirical information is presented in Brechling and Jehn, Feldstein and Halpin.[4]

In this paper, an attempt is made to contribute to the second strand of research. In particular it contains the results of empirical tests of the Baily-Feldstein type of model. For this purpose the main structure and theoretical predictions of the Baily-Feldstein model are presented summarily in section 2. Section 3 contains amendments, elaborations and extentions of the Baily-Feldstein model. The main part of section 3 consists of the parameterization of the experience rating system which corresponds as precisely as possible to a system currently in use in the United States. The empirical tests are presented in section 4 and section 5 contains the main conclusions of the paper.

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The empirical evidence lends substantial support to the BailyFeldstein type of model. In particular the parameters which determine a firm's layoff and rehire decisions seem to be strongly influenced by the degree of experience rating. It would appear, therefore, that increases in the degree of experience rating are likely to lead to substantial decreases in layoffs and, hence, in unemployment.

2. The Baily-Feldstein Model

Although the papers by Baily and Feldstein differ in detail and exposition they contain substantially the same model of layoffs and unemployment insurance. Hence no distinction is made between them. Moreover, since both papers are published in eminent and readily available journals the following summary of the model is verbal, non-formal and brief.[5]

In the Baily-Feldstein model, the firm has to offfer its employees a long-term, say annual, set of employment conditions. These conditions cover (i) the wage rates, (ii) the hours worked, (iii) the probability of being laid off and (iv) the duration of the layoff. The total utility which the worker derives from these four items is a constraint to the firm. It is given by competitive conditions in the labor market. Thus although the firm may vary the four items in a mutually offsetting manner, the value of the total package cannot be changed

by the firm which is assumed to maximize its profits subject to this constraint.

The total contract period is divided into two subperiods: In the first, the firm faces a high price for its output and in the second a low price. Hence, both employment and hours tend to be lower in the second than in the first subperiod and some workers are likely to be laid off at the beginning of the second subperiod. In the long run, however, these layoffs are not involuntary from the workers' point of view because the total expected remuneration contains compensation for the expected layoffs.

The introduction of an unemployment benefit system without experience rating raises the total expected remuneration of workers who are subject to layoffs and, hence, both the workers and the firm should gain. It is important to note, however, that the gain can be realized only through layoffs and, hence, the firm has an incentive to lay off more workers than in the absence of unemployment benefits. In other words, when there is no unemployment benefit system, firms must compensate workers for spells of layoff unemployment. With a benefit system, on the other hand, part of the compensation for layoffs is borne by the unemployment benefit system. Unemployment benefits thus lower the marginal cost of layoffs to firms.

Experience rating may offset, partially or fully, the reduction in the marginal cost of layoffs caused by unemployment benefits. For instance, if the firm was billed immediately for the benefit payments, then, in the absence of income taxes, the marginal costs of layoffs would not be changed and layoffs would be neither encouraged nor discouraged.

The above arguments can be illustrated conveniently by Feldstein's formula for the subsidy to layoffs:

$$J_1 = \frac{[(1-t_b) - (1-t_y)e]b}{(1-t_y)} \qquad (1)$$

Where b is the benefit received by laid-off workers per period of time, e is the proportion of b payable immediately by the firm, t_b is the income tax rate payable on wage income. In the United States $t_b = 0$, so that the formula becomes $J_2 = [1-(1-t_y)e]b/(1-t_y)$. This expression shows that, even if experience rating were perfect, so that, e = 1, the subsidy to layoffs would be positive, namely $J_3 = t_y b/(1-t_y)$. The reason for this phenomenon is that the firm's wage compensation for layoffs is (income) taxable while unemployment benefits are not. These tax effects would disappear only when $t_b = t_y$ so that equation (1) would become $J_4 = (1-e)b$ which, in turn, becomes zero when e = 1, that is, when experience rating is perfect.

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So far, attention has been confined to the impact of the unemployment benefit system upon layoffs. But the Baily-Feldstein model also yields a unique prediction for the impact of the unemployment benefit system on the level of hours worked during the second subperiod. A rise in the layoff subsidy (J) raises the level of layoffs, but it also raises the level of hours worked by the employees who have not been laid off.

The theoretical predictions of the Baily-Feldstein model can thus be stated summarily as follows: Given that unemployment benefits are not (income) taxed, layoffs and average hours worked in the depressed subperiod rise with (i) ceteris paribus increases in unemployment benefits, (ii) ceteris paribus decreases in the degree of experience rating and (iii) ceteris paribus increases in the tax rate on wage income.

It should perhaps be pointed out that one prediction of the Baily-Feldstein model depends crucially on the assumption that the composition of the long-term compensation package changes in response to changes in unemployment benefits. This assumption is attractive and plausible, especially for a long-run analysis. It may be, however, that in some industries competition in the labor market does not generate the kind of responses that are obtained by Baily and Feldstein. What happens, for instance, if the firm's compensation package is independent of unemployment benefits? In the papers by Brechling, this assumption was made.

It leads to the following intuitively plausible results: When the system is experience rated then an increase in unemployment benefits generates a <u>rise</u> in the marginal tax costs of layoffs, and, hence, a <u>decline</u> in the optimal level of layoffs. An increase in the degree of experience rating also raises the marginal tax costs and, hence, as in the Baily-Feldstein model, lowers optimal layoffs. In other words, an increase in unemployment benefits leads to a rise in layoffs in the Baily-Feldstein model but to a reduction in layoffs in the Brechling model. But increases in the degree of experience rating reduce layoffs in both types of models. Since the real world may well be a mixture of the Baily-Feldstein and Brechling models the impact of unemployment benefits on layoffs may not be as strong as that of experience rating.[6]

3. Extensions of the Model

In this section of the paper, two amendments of the Baily-Feldstein model are described and discussed. The first refers to the duration of temporary layoffs and the second to the precise nature of experience rating. Let us deal with the two amendments in turn.

(i) In the Baily-Feldstein model, the price for the firm's output drops to some low level at the beginning of the second subperiod and remains at that level until the end of the sub-

period. In response the firm lays off some employees for the entire subperiod after which presumably they are recalled. In other words, the duration of layoffs for workers who do not search for and obtain jobs at other firms is assumed to equal the second subperiod.

It should be realized, however, that the layoff subsidy (J) can be obtained by the firm not only by laying off more employees but also by lengthening the layoff duration of a given number of layoffs, unless the layoff duration exceeds the maximum unemployment benefit period. Hence, if the firm does have some control over the layoff duration, this duration must be expected to increase with increases in the level of unemployment benefits and with decreases in the degree of experience rating.

It would appear that a relatively minor change in the structure of the Baily-Feldstein model should make the layoff duration a choice variable for the firm. Suppose, for instance, that the firm could hold inventories which could be accumulated in the first subperiod and decumulated in the second subperiod. In these circumstances the following conjecture has intuitive appeal: A rise in unemployment benefits or a fall in the degree of experience rating should induce the firm to raise its production at the beginning of the first subperiod, to accumulate inventories, lay off some employees before the beginning of the second subperiod and, thereafter, to decumulate inventories. In

this case the layoff duration for, at least, some laid-off workers is likely to exceed the second subperiod. Since the main focus of this paper is empirical rather then theoretical, the above conjecture has not been examined formally. It is simply hypothesized that, since firms have an inducement to lengthen the layoff duration in response to a rise in the layoff subsidy, some firms actually do lengthen the layoff duration. Hence the average layoff duration is expected to react positively to increases in unemployment benefits and negatively to increases in the degree of experience rating.

(ii) The second amendment to the Baily-Feldstein model consists of a precise parameterization of the experience rating provisions. In the Feldstein treatment, for instance, the degree of experience rating is summarized by one parameter, namely e, the proportion of benefit payments charged to the firm. Actually the relevant laws do not fix e but another set of parameters, so that observed levels of e are likely to be endogenous in the firm's decision process.

Several systems of experience rating are currently in use in the United States. The reserve ratio method is, however, the most common system. It is used in 32 states. The ensuing theoretical discussion as well as the later empirical analysis are confined entirely to the reserve ratio method.

Under the reserve ratio method of experience rating each
firm is assigned an account in the state unemployment insurance
system. The balance in this account changes in response to tax
inflows and benefit outflows. Formally:

$$B_t - B_{t-1} = \tau_t m - b_t \qquad (2)$$

Where B_t is the firm's balance at the end of period t, τ is
the tax rate, m is the tax base or taxable payroll and b are the
benefit payments which are charged to the firm. All flows are
measured per calendar year and, for the sake of simplicity,
B_t, m and b_t are normalized for the level of employment, so
that they measure balance, taxable payroll and benefits per
employee. When equation (2) is divided by m, its left-hand side
represents changes in the reserve ratio:

$$R_t - R_{t-1} = \tau_t - \frac{b_t}{m} \qquad (3)$$

where R_t is the reserve ratio at the end of period t.

The essence of the reserve ratio method of experience
rating consists of a link between τ_t and R_{t-1} which is
given by the tax schedule. A typical such schedule is presented
in figure 1. The unbroken line (A-B-C-D-E-F) is described fully
by five parameters: NEGTAX, MAXTAX, SLOPE, MINTAX and MINRES.
Let us discuss them in turn.

FIG. 1: TYPICAL TAX SCHEDULE

In the figure:
- Vertical axis: τ_t
- Horizontal axis: R_{t-1}
- Point a near top of vertical axis
- A — NEGTAX — B
- C — MAXTAX — D — K'
- τ^*
- $\text{SLOPE} = -\dfrac{d\tau_t}{dR_{t-1}}$
- K
- E — MINTAX — F
- G and H endpoints of dashed line
- MINRES R^*

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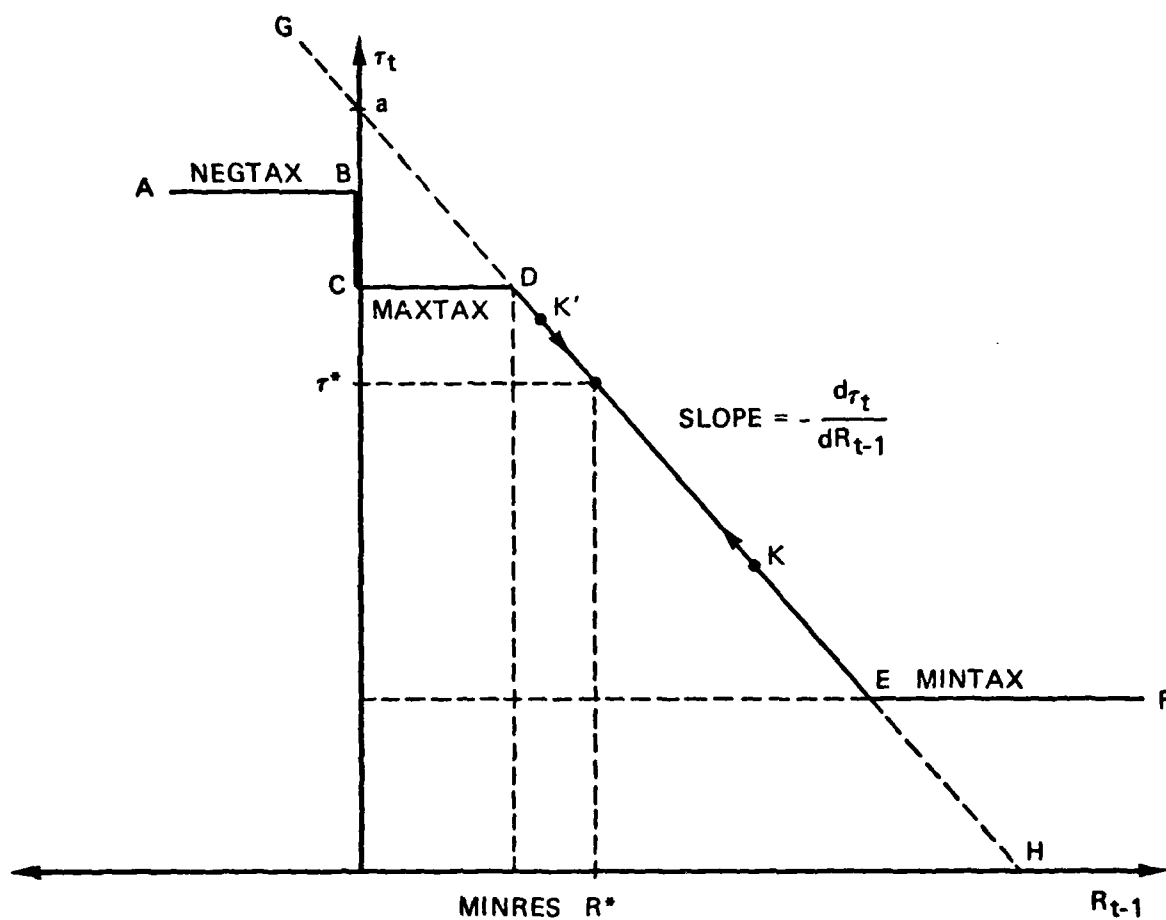
NEGTAX is the tax rate which applies to firms with a negative balance, that is along (A-B).

MAXTAX is the highest tax rate applicable for firms with positive balances along (C-D).

SLOPE measures the slope of the line (D-E). Actually there are a large number of small steps along (D-E) which have been approximated by a straight line.

MINTAX is a critical low tax rate at which the tax schedule becomes horizontal, namely along (E-F).

MINRES is the minimum reserve ratio at which the sloped part of the tax schedule begins.

All five parameters are necessary and sufficient for a complete description of the schedule. Moreover, each may change ceteris paribus. The laws of the 32 states with the reserve ratio method of experience rating determine the tax schedules which imply the above five parameters. Moreover, the parameters vary automatically with the aggregate balance in a state's unemployment insurance fund. When the fund level falls below certain trigger levels, the parameters are changed so as to ensure increased tax flows and vice versa.

The next question to be answered is: How do changes in the above five parameters affect the degree of experience rating? To answer this question let us begin by assuming that the tax

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schedule has no kinks or steps, so that it is sloped throughout like the line (G-H) which has its intercept at a. The tax rate τ_t can then be expressed as a simply function of R_{t-1}:

$$\tau_t = a - s\, R_{t-1} \qquad (4)$$

where s = SLOPE. Note that s is measured as a positive number: a rise in s means that the slope of the function gets steeper. When equations (3) and (4) are combined a simple first-order difference equation is obtained:

$$R_t = (1-s)\, R_{t-1} + a - \frac{b_t}{m} \qquad (5)$$

Since s is always smaller than unity (typically $s \simeq 3$), equation (5) is stable in the sense that it approaches $R^* \simeq R_t = R_{t-1}$ for any constant $\left(a - \dfrac{b_t}{m}\right)$. The steady-state reserve ratio is given by:

$$R_t^* = \frac{1}{s}\left(a - \frac{b_t}{m}\right) \qquad (6)$$

which, in turn, implies:

$$\tau_t^* = \frac{b_t}{m} \quad \text{or} \quad \tau_t^*\, m = b_t \qquad (7)$$

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Thus, in the steady state, tax inflows just equal benefit out-
flows and, hence, the balance and reserve ratio do not change.

The dynamic pattern described by equation (5) depends cru-
cially on autonomous changes in the average benefit payments per
employee, b_t. The latter is equal to the product of (a) the
firm's layoff rate, (b) the average duration of layoffs and (c)
unemployment benefit per period of time. Increases in one or
more of these three variables lead to an increase in b and,
hence, raise benefit outflows in relation to tax inflows.

Suppose, for instance, that the reserve ratio and tax rate
are at K in figure 1. If R^*_t and τ^*_t are the relevant
steady state values, then K represents a point at which benefit
outflows exceed tax inflows, so that R_{t-1} is falling and
τ_t is rising. During the transition the firm's balance is re-
duced. Conversely if the firm is initially at K', then tax
inflows exceed benefit outflows and hence the firm's reserve
ratio must rise and the tax rate must fall. During the transi-
tion period the balance is built up.

Suppose now that there is a cyclical pattern in b_t: let
it be high in recessions and low in booms. Consequently the
firm's balance is run down in recessions and built up in booms.
But since τ_t and R_{t-1} always move toward a position
where benefit outflows equal tax inflows, the firm's tax pay-
ments tend to equal benefit outflows, when both are summed over

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a sufficiently long period of time. In this limited sense, a tax schedule without kinks or steps and a non-zero slope would ensure full experience rating.

So far, however, neither benefit outflows nor tax inflows have been discounted. Once discounting is introduced, the speed with which the tax rate adjusts to benefit outflows becomes important. Suppose, for instance, that the firm increases its layoffs, thereby raising b_t. If, in response, tax rates rise very slowly the tax cost of the layoffs is payable in the distant future and its discounted value is quite small. Conversely, if the firm reduces b_t and tax rates fall very slowly, the discounted value of the future tax savings may be minimal. The speed with which the tax rate adjusts to benefit outflows depends on two factors. First, there is the discrete lag of τ_t behind R_{t-1}, which seems to be necessary for administrative purposes. Second, there is the speed at which the reserve ratio R_t moves toward its steady state value R_t^*. As is evident from equation (5), this speed depends crucially on the slope of the tax schedule(s). For the sake of realism, let us confine attention to the case in which $0 < s \leq 1$. As s rises from zero toward unity, the dependence of R_t on the state variable R_{t-1} decreases and, hence, the relative importance of b_t increases. When $s=1$, R_t becomes independent of R_{t-1} :

$$R_t = a - \frac{b_t}{m} = R_t^* \qquad (8)$$

and hence:

$$\tau_t = \frac{b_{t-1}}{m} = \tau_{t-1}^* \qquad (9)$$

so that the reserve ratio R_t is invariably at the steady state value which is appropriate for period t and the tax rate τ_t is the steady state value which is appropriate for period (t-1). Given that the discrete lag of τ_t behind R_{t-1} is necessary for administrative purposes, s=1 represents the fastest reaction of the tax rate to changes in benefit flows. It represents the highest achievable degree of synchronization between benefit outflows and tax inflows.

The following important conclusion has thus been reached. If the tax schedule has no kinks or steps and has a negative slope throughout, then in the long run a firm's tax inflows equal its benefit outflows. But tax inflows lag behind benefit outflows. The speed with which taxes adjust to benefits depends on the slope of the tax schedule. As s rises from zero to unity this speed increases. The degree of experience rating thus reaches a maximum when s=1. At the other extreme, when s=0, the tax rate is independent of benefit outflows so that the degree of experience rating is zero.

Unfortunately the existence of steps and kinks in actual tax schedules does necessitate some revision of the above simple conclusion. Let us, therefore, analyze the effects of _ceteris paribus_ changes in all five parameters, NEGTAX, MAXTAX, SLOPE, MINTAX, MINRES.

An increase in NEGTAX is illustrated in figure 2a. It simply raises the step which occurs at $R_{t-1} = 0$. This change can be interpreted as an increase in the average slope of the schedule in its upper range, and, hence, it increases the degree of experience rating. In other words, firms now have an increasesd incentive to avoid NEGTAX and thus an increased incentive to reduce benefit outflows.

An increase in MAXTAX is shown in figure 2b. Two effects of this change can be distinguished. First, the step at $R_{t-1} = 0$ is reduced and this leads to a reduction in the average slope of the schedule in its upper range. This reduces the degree of experience rating. Second, firms which initially are at MINTAX between E and E' are now shifted, at least temporarily, to the sloped part of the schedule between G and E' and this increases the degree of experience rating. Thus a rise in MAXTAX leads to a decrease in the degree of experience rating in the upper range and to an increase in the lower range of the tax schedule.
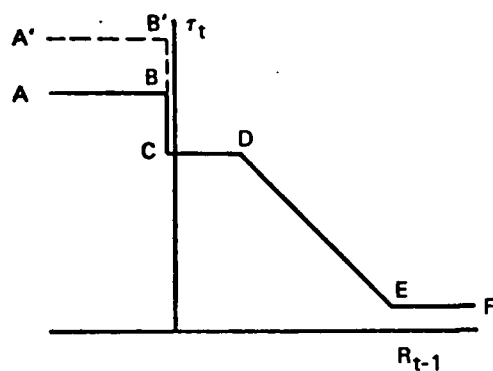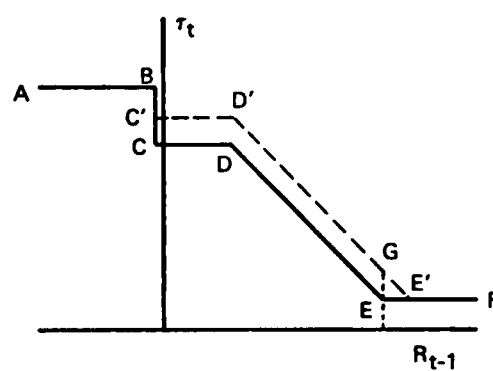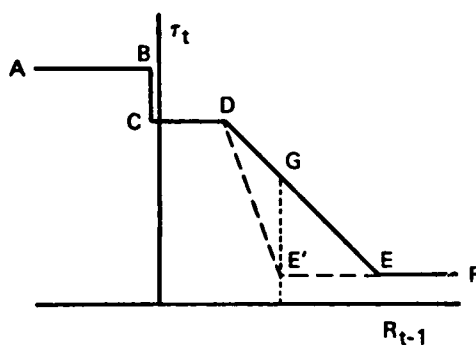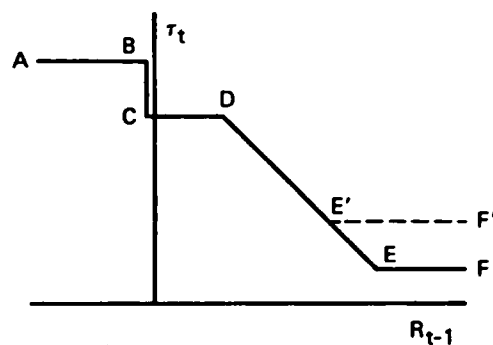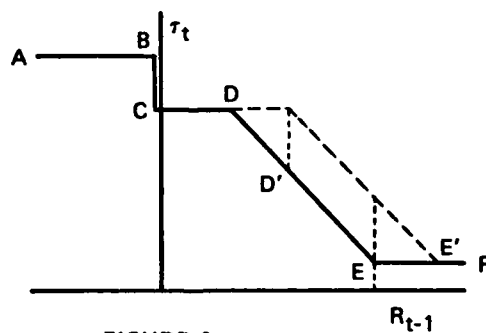
FIGURE 2a

FIGURE 2b

FIGURE 2c

FIGURE 2d

FIGURE 2e

FIG. 2: INCREASES IN NEGTAX, MAXTAX, SLOPE, MINTAX AND MINRES

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Next consider an increase in SLOPE which is illustrated in figure 2c. Again two effects can be distinguished. First, for firms that are initially located between D and G the tax schedule becomes steeper and, hence, the degree of experience rating is increased. Second, firms initially located between G and E are now moved (at least, temporarily) to MINTAX and cease to be experience rated. Thus, between D and G the tax becomes more experience rated and between G and E it becomes less experience rated.

An increase in MINTAX is shown in figure 2d. It unambiguously reduces the degree of experience rating because firms that are located initially between E' and E are no longer experience rated. A rise in MINTAX thus reduces the range of tax rates over which experience rating applies.

Finally, a rise in MINRES is illustrated in figure 2e. Again the impact on experience rating is ambiguous. Firms located between D and D' cease to be experience rated at least temporarily. Firms initially located between E and E', on the other hand are moved to the sloped part of the schedule and therefore become experience rated.

This concludes the discussion of the two extensions to the Baily-Feldstein model. According to the first, the layoff duration is treated as a variable which responds positively to increases in unemployment benefits and negatively to increases in

the degree of experience rating. The second extension concerns the parameterization of experience rating. It has been related to the parameters of the tax schedule for the reserve ratio method. Accordingly the degree of experience rating is related positively to NEGTAX and negatively to MINTAX. MAXTAX, SLOPE and MINRES also tend to influence the degree of experience rating, but a priori argument does not yield unambiguous sign predictions.

4. Empirical Evidence

This section contains some relevant empirical evidence on the relationship between the parameters of the unemployment insurance system and layoffs, rehires, hours and layoff duration. First, the theoretical predictions are restated summarily, second, the data are discussed and thereafter the results are presented.

The theoretical arguments in sections 2 and 3 have generated the prediction that layoffs, hours and layoff duration should all rise with increases in unemployment benefits and with decreases in the degree of experience rating. Since the flow of temporary layoffs may be measured either by layoffs or by rehires, the above prediction applies also to rehires. The prediction can be made specific by using the parameters of the tax

structure. Thus, the four dependent variables, layoffs, re-
hires, hours and layoff duration should:

(i) increase with increases in unemployment benefit rate,

(ii) decrease with increases in NEGTAX and

(iii) increase with increases in MINTAX,

but their responses to changes in MAXTAX, SLOPE and MINRES may
be positive or negative. Further, in view of the qualifying
comments at the end of section 2, the impact of unemployment
benefits may be weak. The empirical research underlying this
paper has been designed to test these specific propositions.

Since the models discussed in sections 2 and 3 describe the
behavior of individual firms, the data on layoffs, rehires,
hours and layoff duration should ideally also refer to individ-
ual firms. Unfortunately, however, no such micro data are
readily available. Consequently the data used in the actual
computations are aggregates. Specifically layoff rates, rehire
rates and average weekly hours refer to averages in industry-
state-year categories. Further, since no information on layoff
duration is readily available, the duration variable is average
unemployment duration (in weeks). Unemployment duration, aver-
age unemployment benefits (weekly in dollars), and the tax
parameters NEGTAX, MAXTAX, SLOPE, MINTAX and MINRES all refer to
state-year categories. The years covered are 1962-69 and the
states are all reserve ratio states. But for some industry-

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state-year categories not all relevant data are available and, hence, these categories have been omitted. The number of observations is 170 for total manufacturing and for two-digit industries it varies between 126 and 48 with a mean of about 96. All the data are readily available from Employment and Earnings and various publications of the Federal Unemployment Insurance Service.[7]

For purposes of estimation the following specific assumptions and amendments have been made.

First, unemployment benefits are typically a fraction of previous earnings up to a certain limit. Hence, a state's benefit liberality should be measured, not by absolute benefits but by benefits in relation to wage rates. For this reason the straight- time hourly wage rate was introduced as an additional explanatory variable. This procedure has some obvious disadvantages and, at some future date, it will hopefully be replaced by the use of a set of parameters which describe benefit liberality.

Second, the influence of all the explanatory variables upon the four dependent variables are assumed to be linear.

Third, an additional explanatory variable is COVERAGE which is the ratio of employees covered by unemployment insurance to total employees. This variable has been included to take account of the fact that layoffs, rehires and hours refer to

total employment while the other variables refer only to covered employment.

Fourth, since the four dependent variables fluctuate cyclically, annual intercept dummies have been included as explanatory variables.

Having stated the theoretical predictions and discussed the data used in the empirical analysis, let us now turn to an examination for the empiriacl results. Table 1 contains the regression coefficients when layoffs, rehires, hours, wage and coverage refer to total manufacturing. Let us discuss, in turn, the influences of the various parameters of the unemployment insurance system.

First, benefits have a positive but weak influence upon layoffs and duration and none on rehires and hours. This may be due to the reasons given at the end of section 2 of this paper. But this weak result may also be due to multicollinearity. The simple coefficient of correlation between wage and benefit is 0.82. This may have caused the standard errors of both variables to be large.

Second, NEGTAX has a strong negative influence upon all four dependent variables. This finding lends substantial empirical support to the theoretical argument that a *ceteris* *paribus* increase in NEGTAX increases the degree of experience rating and, hence, reduces all four dependent variables.

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TABLE 1

The Regression Coefficients for Total Manufacturing

(t-ratios in parentheses)

Independent Variable		Dependent Variables			
	Mean Value	Layoffs	Rehires	HOURS	DURATION
		1.449	1.262	41.12	11.18
WAGE	2.490	.2556 (1.78)	-.0657 (.63)	-.1082 (.38)	.1329 (.28)
BENEFITS	36.20	.0136 (1.37)	.0047 (.66)	-.0068 (.35)	.0486 (1.51)
NEGTAX	3.452	-.2398 (3.68)	-.1113 (2.37)	-.3011 (2.34)	-.6810 (3.22)
MAXTAX	2.899	.2391 (3.00)	.1929 (3.35)	.6541 (4.15)	.5202 (2.01)
SLOPE	.3237	.1998 (.6472)	.6054 (2.72)	3.458 (5.67)	2.3846 (2.38)
MINTAX	.4731	.1474 (1.84)	.1286 (2.23)	-.2276 (1.44)	1.0264 (3.96)
MINRES.	3.535	.0146 (.66)	-.0229 (1.43)	-.0571 (1.30)	.1308 (1.82)
COVERAGE	.9941	-12.884 (4.84)	-8.401 (4.37)	-30.446 (5.79)	-6.721 (.78)
DUM 63		-.1985 (1.35)	.0072 (.07)	.1458 (.50)	-.2491 (.52)
DUM 64		-.2475 (1.69)	-.0252 (.24)	.3064 (1.06)	-.3512 (.74)
DUM 65		-.4253 (2.91)	-.1532 (1.45)	.6055 (2.10)	-1.0128 (2.13)
DUM 66		-.4940 (3.14)	-.0741 (.65)	1.1739 (3.78)	-1.8601 (3.65)
DUM 67		-.4899 (3.00)	-.0607 (.51)	.3745 (1.16)	-1.9971 (3.77)
DUM 68		-.7873 (4.59)	-.1417 (1.14)	.5113 (1.51)	-1.7286 (3.10)
DUM 69		-.8390 (4.69)	-.2518 (1.95)	.3197 (.90)	-2.0440 (3.52)
CONSTANT		13.514 (5.20)	9.344 (4.97)	69.793 (13.59)	16.055 (1.90)
R^2		.440	.358	.559	.428

Third, MAXTAX has a strong positive influence on all four dependent variables. The joint impact of NEGTAX and MAXTAX suggests that the average slope of the tax schedule in its upper range is an especially important determinant of the degree of experience rating.

Fourth, SLOPE has a positive influence which is weak for layoffs but quite strong for the other three dependent variables. In terms of the theoretical arguments in section 3 of this paper the positive relationship can be interpreted as follows: As SLOPE increases, some firms cease to be experience rated and their reaction must be stronger than that of firms which remain on the sloped part of the schedule and thus face an increase in the degree of experience rating.

Fifth, the influence of MINTAX is positive and quite strong for layoffs, rehires and duration and weakly negative for hours. The theory predicts an unambiguous positive sign. Hence, the empirical evidence lends some support to the theory.

Sixth, the influence of MINRES is not uniform. It is strong only for duration in which case it is positive.

Seventh, coverage has a very strong negative impact on layoffs, rehires and hours and a weak one on duration. There are two possible explanations of this strong effect. In the first place, it might be argued that extensions of the unemployment insurance system reduce layoffs, rehires and hours among newly

covered employess. If this interpretation is accepted, then the coefficients of coverage constitute fairly strong prima facie evidence against the Baily-Feldstein model. In the second place, it might be argued that coverage simply corrects for the fact that layoffs, rehires and hours refer to total employment while the unemployment insurance parameters apply to only covered employment. Let x be such a parameter and let $f(x)$ be the layoff rate for covered employees and α that for uncovered employees. It can then be shown easily that the total layoff rate is the weighted average of the covered and uncovered rates: $f(x)*\text{COVERAGE} + \alpha(1-\text{COVERAGE})$, so that the linear effect of coverage is negative. A complete test of this proposition would, however, require that coverage be used multiplicatively with the other unemployment insurance parameters. The fact that duration, which refers only to covered employees, is not affected by coverage lends some support to the second explanation of the strong negative impact of coverage on layoffs, rehires and hours.

Finally the annual dummy variables reflect the well-known cyclical pattern in labor turnover, hours and unemployment: As the economy moves into a boom, layoffs, rehires and duration decline and hours rise.

Table 2 contains the number of positive and negative coefficients as well as the number of significant coefficients for

TABLE 2

Signs and Significance of Regression Coefficients
for 16 Two-Digit Manufacturing
Industries

| | LAYOFFS | | | | REHIRES | | | | HOURS | | | |
| | POS | | NEG | | POS | | NEG | | POS | | NEG | |
	TOT	SIG*	TOT	SIG*	TOT	SIG*	TOT	SIG*	TOT	SIG*	TOT	SIG*
WAGE	8	3	8	6	7	6	9	6	4	4	12	9
BENEFITS	10	8	6	1	9	4	7	3	12	3	4	3
NEGTAX	2	0	14	11	4	0	12	6	4	2	12	6
MAXTAX	13	6	3	1	10	5	6	4	7	7	9	5
SICPE	5	1	11	5	7	5	9	3	11	5	5	2
MINTAX	9	5	7	2	11	6	5	3	8	4	8	5
MINRES	9	2	10	5	9	3	7	4	10	4	6	3
COVER	6	2	10	5	9	3	7	4	10	3	6	2

*A significant coefficient is one with a t-ratio in excess of 1.5 (all t-ratios are treated as positive numbers).

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the layoff, rehire and hours equations run on data for 16 two-digit manufacturing industries. Since duration is not available by industry, its equation is not included. Further, the reader is reminded that benefits refer to benefits in the state as a whole and not to those paid in the industry.

By and large the disaggregated data reflect the same pattern as the aggregate ones. Benefits, MAXTAX and MINTAX still seem to have predominantly positive coefficients. The influence of NEGTAX is still strongly negative. Disaggregation has led to a fair number of negative signs of SLOPE. Moreover, disaggregation has much weakened the strong negative effect of coverage, especially for rehires and hours.

The strong and consistent negative influence of NEGTAX is especially encouraging because it is incompatible with the argument that high labor turnover rates cause high tax schedules. As already mentioned, in most states the laws provide for automatic increases in the entire tax schedule as the state unemployment insurance fund falls. It might be argued, therefore, that a rise in layoffs may cause a rise in benefit payments, a fall in the state fund and, hence, a rise in the tax schedule. This argument would not, however, generate a _fall_ in NEGTAX.

Another interesting aspect of the empirical results appears in the duration equation. Hitherto unemployment duration has been investigated primarily in terms of unemployment benefits

and personal characteristics. As mentioned in the introduction, the papers by Classen and Ehrenberg and Oaxaca are excellent examples of this type of research. The evidence in table 1 suggests, however, that duration is much more responsive to the tax parameters than to benefits. All five tax parameters, NEGTAX, MAXTAX, SLOPE, MINTAX and MINRES have a significant impact on duration. This evidence is consistent with a theory according to which duration is controlled to a significant extent by firms through their recalls of temporarily laid-off workers.

This concludes the presentation of the empirical results. In view of the fact that the unemployment insurance tax constitutes a relatively small proportion of the payroll, the empirical results seem quite strong. NEGTAX has a consistently strong negative impact on layoffs, rehires, hours and duration. MINTAX and benefits have predominantly positive effects. All three effects are unambiguous predictions of the theory. Two other parameters of the tax structure, MAXTAX and SLOPE tend to have significant effects on the four dependent variables. Thus the results seem to be quite consistent with a Baily-Feldstein type of model. Even if this kind of model should be refuted by future evidence, it seems clear that many strong empirical associations exist among labor market phenomena and the parameters of the unemployment insurance system.

5. Conclusions

In this paper an attempt has been made to examine the relationship between layoffs and the unemployment insurance system. The starting point of the analysis has been the Baily-Feldstein model according to which both layoffs and average hours worked increase with (i) increases in unemployment benefits and (ii) decreases in the degree of experience rating of the unemployment insurance tax. This model has been extended by letting the layoff duration be endogenous and by parameterizing experience rating. The empirical examination of the relationship between layoffs, rehires, hours and unemployment duration as dependent variables and the parameters of the unemployment insurance system as explanatory variables has yielded very encouraging results. The strongest impact is that of NEGTAX, the tax rate which applies to firms with a negative balance in the unemployment insurance fund. A rise in NEGTAX reduces layoffs, rehires, hours and unemployment duration.

Although the empirical results have been encouraging, they also suggest further research. In particular, it seems desirable to have a better parameterization of benefit liberality than has been used in this paper. Further, it may be necessary to model explicitly the determination of the parameters of the unemployment insurance tax.

The implications of the research findings are fairly obvious. Increases in NEGTAX tend to reduce strongly both layoffs and unemployment duration. The approximate elasticities of these two relationships are .55 and .21 respectively so that a rise in NEGTAX of 10 percent (from, say, 3.4 to 3.74) might reduce layoff unemployment by as much as 7 percent. Moreover increases in NEGTAX would improve the financial viability of the unemployment insurance system on two counts: tax inflows would rise and benefit outflows would fall because of the reduced layoff unemployment.

It is not claimed that the empirical research underlying this paper is more than a first attempt at discovering potentially important relationships. Thus while the results are most encouraging no finality is claimed for them at this stage.

FOOTNOTES

[1] Kathleen P. Classen: "The Effect of Unemployment Insurance on the Duration of Unemployment and Subsequent Earnings," Industrial and Labor Relations Review, July 1977, p. 438.

Ronald G. Ehrenberg and Oaxaca, Ronald L.: "Unemployment Insurance, Duration of Unemployment, and Subsequent Wage Gain," American Economic Review, December 1976, p. 754.

Daniel S. Hamermesh: "Unemployment Insurance and Labor Supply," Mimeo 1978.

No attempt is made in this paper to give an adequate assessment of the previous literature which has become quite large. Hence

only selected references are given.   Interested readers are
referred to:

Arnold Katz (Ed.):   "The Economics of Unemployment Insurance:
    A Symposium," Industrial and Labor Relations Review, July
    1977.

Daniel S. Hamermesh: Jobless Pay and the Economy, Baltimore,
    Johns Hopkins University Press, 1977.

[2] The literature on this topic is also increasing quite fast.
Important initial papers are the following:

C. Azariadis: "Implicit Contracts and Underemployment Equilib-
    ria," Journal of Political Economy, November/December
    1975,
    p. 1183.

Martin N. Baily: "Wages and Employment Under Uncertain
    Demand," Review of Economic Studies, January 1974, p. 37.

Robert J. Gordon: "The Welfare Costs of Higher Unemployment,"
    Brookings Papers on Economic Activity, 1973(1),
    p. 133.

[3] Martin N. Baily: "On the Theory of Layoffs and Unemploy-
    ment," Econometrica, July 1977, p. 1043.

Frank Brechling: "The Incentive Effects of the Unemployment
    Insurance Tax," in Research in Labor Economics, edited by
    Ronald G. Ehrenberg, Greenwich or JAI PRESS, 1977, p. 41.

Frank Brechling: "Unemployment Insurance Taxes an Labor Turn-
over: Summary of Theoretical Findings," Industrial and
Labor Relations Review, July 1977, p. 483.

Martin Feldstein: "Temporary Layoffs in the Theory of Unemploy-
ment," Journal of Political Economy, October 1976,
p. 937

[4] Frank Brechling and Christopher Jehn: "The Unemployment
Insurance Tax and Labor Turnover: An Empirical Analysis,"
CRC 349, Public Research Institute, Center for Naval
Analyses, 1978.

Martin Feldstein: "The Effect of Unemployment Insurance on
Temporary Layoff Unemployment," American Economic Review,
December 1978, p. 834.

Terry Halpin: "The Effect of Unemployment Insurance on Seasonal
Fluctuations in Employment," Industrial and Labor Relations
Review, forthcoming.

[5] In a recent paper Dale Mortensen presents a generalized ver-
sion of the Baily-Feldstein model and shows that under theoret-
ically standard conditions layoffs will not occur in the Baily-
Feldstein model. See:

Dale T. Mortensen: "On the Theory of Layoffs," Discussion Paper
No. 322, The Center for Mathematical Studies in Economics

and Management Science, Northwestern University, March
1978.

[6] It should also be pointed out that the shifting and redis-
tribution of both the unemployment *benefits* and the unemployment
tax is likely to follow a possibly complex dynamic path.

[7] A detailed description of the data is available from the
author.